CONVERTING PERIOD PRIORS INTO LOG-SPACE

Although the perior prior is most directly considered in linear space (i.e. $\Pr(P)$), the broad range of the prior makes it often more convenient to plot in logarithmic space (i.e. $\Pr(\log P)$). It is straight-forward to convert any arbitrary period prior into log-space as follows. We first note that

$$\Pr(\log P)\mathrm{d}\log P = \Pr(P)\mathrm{d}P, \tag{1}$$

and by the chain rule we have

$$\Pr(\log P)\mathrm{d}\log P = \Pr(P)\frac{\mathrm{d}P}{\mathrm{d}\log P}\mathrm{d}\log P. \tag{2}$$

Since $\mathrm{d}\log P/\mathrm{d}P = 1/P$, then

$$\Pr(\log P)\mathrm{d}\log P = \Pr(P)P\mathrm{d}\log P. \tag{3}$$

The final step is to replace $P \rightarrow \exp(\log P)$ and then one has obtained the distribution in log-space. For example, if $\Pr(P) \propto P^{\alpha}$, then

$$\Pr(\log P)\mathrm{d}\log P = e^{(\alpha+1)\log P}\mathrm{d}\log P. \tag{4}$$

Corresponding author: David Kipping
dkipping@astro.columbia.edu